

PAGES

MISSING



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Engineering
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OF CANADA

OFFICIAL PROCEEDINGS

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PROCEEDINGS OF THE CENTRAL RAILWAY AND EN-
GINEERING CLUB OF CANADA MEETING.

ROSSIN HOUSE, TORONTO, February 19th, 1907.

The President, Mr. Kennedy, occupied the chair.
The Chairman,—

If any of the gentlemen present have any new members
to nominate, would request that they step up and see the

Secretary. I would also request that each member present fill in the attendance cards so that the Secretary will have proper record of all members in attendance at the meeting.

Before going any further I would first invite the first and second vice-presidents, if present, to take seats in front, also as many members of the Executive that are present to do so, as the members all like to look at the faces of the Executive.

The Chairman,—

The first order of business is the reading of the minutes of the previous meeting. I think that each member has received a copy of the proceedings of our previous meeting, if not it is owing to the fact that the Secretary has not got your proper address.

I wish to say to you that each and every month the minutes will be forwarded to you at the address that the Secretary has, and if you do not receive them it is due to the Secretary having an improper address.

Moved by Mr. McRae, seconded by Mr. Burrows, that minutes as reported of proceedings be adopted.

The Chairman,—

The next order of business is the remarks of the President. I might say, gentlemen, that I have nothing to bring forward for the good of the Club to-night, with the exception to say to you that we have through the courtesy of the manager of this hotel procured this room for our meeting and that they have requested us to refrain from smoking while in here. You will note that they have been very kind and given us the best chairs in the house and they have made that request of us, possibly on account of the injury to the furniture and carpets.

The Chairman,—

The next order of business is the announcement of new members. We will now call upon the Secretary to read the new members.

NEW MEMBERS.

- J. Hay, Locomotive Foreman, G.T.R., Palmerston.
- T. A. Hollinrake, A. R. Williams Machinery Co., Toronto.
- F. Henry, Stark Heat, Light & Power Co., Toronto Junction.
- W. H. Randall, Meter & Machine Dept., Toronto Water Works, Toronto.
- R. L. Frost, Chief Engineer Labatt Mfg. Co.
- H. Overend, Engineer G.T.R., Toronto.
- A. Lichtenhein, Rep. Galena Signal Oil Co., Montreal.
- F. G. Butterfield, Vice-President Butterfield & Co., Rock Island, Que.
- Geo. W. Thompson, Superintendent Mechanical Dept., T. Eaton Co., Toronto.

- W. Higgin, T. Eaton Co., Toronto.
 Thos. Hampton, Rep. Edgar Allen & Co., Limited, Montreal.
- Frank Stortz, Air Brake Dept., G.T.R., Sarnia Tunnel.
 C. A. Livingston, Locomotive Foreman, G.T.R., Fort Erie.
 F. A. Purdy, Manager Canadian Gold Car Heating & Lighting Co., Montreal.
- J. Christopher, Engineer, G.T.R., Toronto.
 Geo. T. Merwin, General Agent, Safety Car Heating & Lighting Co., Montreal.
- T. F. Case, Salesman, Philip Carey Mfg. Co., Toronto.
 Wm. Crane, Toronto.
 S. W. Price, Machinist, G.T.R., Toronto.
 J. Dickson, Machinist, G.T.R., Toronto.
 J. D. Hyde, Machinist, G.T.R., Toronto.
 Luke McLaughlin, Leading Fitter, G.T.R., Toronto.
 L. Salter, Machinist, G.T.R., Toronto.
 J. D. Scott, Machinist, G.T.R., Toronto.
 J. R. Armer, Machinist, G.T.R., Toronto.
 Wm. Delaney, Machinist, G.T.R., Toronto.
 I. O. Frost, Carpenter, G.T.R., Toronto.
 F. W. Brent, Machinist, G.T.R., Toronto.
 A. Hallamore, Machinist, G.T.R., Toronto.
 Geo. Burleigh, Machinist, G.T.R., Toronto.
 W. W. Barker, Machinist, G.T.R., Toronto.
 J. W. Perry, Machinist, G.T.R., Toronto.
 W. H. Wensley, Locomotive Foreman, G.T.R., Niagara Falls.
- T. F. Monypenny, Vice-President Imperial Varnish & Color Co., Toronto.
 Hannibal, Greens, Sons & Co., Burden Iron & Steel & Heavy Hardware Co., Troy, N.Y.
 E. E. Palmer, B.A., Sec., Toronto.
 W. J. Robertson, Eastern Rep. Mushett Steel Co., St. Alban's, Vt.
 S. Groves, Mechanical Engineer, Toronto.
 Lewis C. Ord, Locomotive Foreman, C.N.O. Ry., Parry Sound.
- Geo. Cooper, Road Foreman, G.T.R., Sarnia Tunnel.

MEMBERS PRESENT.

February 19th, 1907.

Alex. M. Smith.
 W. H. Wensley.
 J. T. Carlind.
 Wm. E. Saylor.

L. C. Ord.
 A. S. Wright.
 T. Wiles.
 W. Kennedy.

W. C. Hollawell.
 J. Hay.
 W. Delaney.
 A. Hallamore.

F. Dale.	T. G. Lewis.	M. W. Barker.
Geo. Baldwin.	Philip McCabe.	Geo. Cooper.
F. R. Dickson.	R. N. Card.	F. W. Burrows.
Harry Ellir.	E. Logan.	H. Winnett.
J. McWater.	L. J. McLaughlin.	H. Overend.
Geo. Shand.	F. Clements.	S. W. Price.
R. L. Frost.	R. Ivers.	R. Preston.
C. Boyden.	W. R. McRae.	W. H. Kendall.
H. H. Brewer.	J. V. Jackson.	L. Salter.
J. W. Kelly.	C. A. Jefferis.	I. O. Frost.
A. B. Brown.	Acton Burrows.	Geo. Burleigh.
W. N. Borthwick.	J. R. Armer.	J. W. Perry.
J. W. Perry.	J. M. Clements.	J. B. Wilson.
Geo. Black.	G. R. Coles.	A. J. H. Eckardt.
Jas. D. Scott.	Robt. Pearson.	Frank Stortz.
F. W. Brent.	H. Cowan.	C. A. Livingston.
Wm. Crane.	J. A. Mitchell.	J. Dickson.
J. C. Garden.	F. Tushingam.	I. Jefferis.
Jno. J. Beck.	H. G. Fletcher.	C. L. Worth.

Secretary,—

I might say that the only unfinished business is the appointment of Auditors, the Executive recommending Messrs. Hudson, Tushingam and Baldwin.

The Chairman,—

You have all heard the names as recommended by the Executive read by our Secretary. As these are to be our Auditors, and in order to avoid an election, if anyone would move the adoption we would be pleased to have them do so.

Moved by Mr. A. S. Wright, seconded by Mr. McRae, that the Auditors as read by the Secretary and recommended by the Executive be elected. Carried unanimously.

The Chairman,—

There being no discussion in regard to the paper read by Dr. Galbraith, we will proceed with the reading of the paper. I might say, gentlemen, that we have with us to-night Mr. A. B. Brown, representative of the Canadian Westinghouse Air Brake Co., who has kindly consented to give us a paper to-night, on "A Description of Triple Valves Designed for Modern Steam Railway and Traction Service." I think that most of the members present are personally acquainted with Mr. Brown and too much cannot be said of his kindness in coming to us so early in the formation of this Club of ours, to give us a paper that I am sure will be very interesting to all present, and we know from past experience Mr. Brown has had in this line that he is quite capable of imparting much valuable information to us on this subject.

LECTURE ON ADOPTION OF TRIPLE VALVE DESIGNED FOR MODERN STEAM RAILWAY AND TRACTION SERVICE.

BY MR. A. B. BROWN, REPRESENTATIVE OF THE WESTINGHOUSE AIR BRAKE CO.

Mr. Chairman, and gentlemen:—Before taking up the subject to be discussed this evening, would like to state that I am much pleased to be with you for the purpose of a general discussion of air brake matters. I feel under obligations to the Executive Committee of the Club for thus giving me an early opportunity to explain the recent improvements our company have made in braking made necessary by the changing conditions upon steam and electric railways. You will note from the advance copies of the paper to be read, that the subject matter is rather brief. I hope you will not feel that in submitting such a short report I am attempting to lower the standard of the papers of the Club. Instead I thought it would be best to simply outline the reason for the various changes and to describe the advantages and operation of the various valves on the screen. The slides that will be exhibited show very plainly the various ports and passages, and therefore one can get a clear conception of the different valves.

I believe I voice the sentiments of all present this evening with the statement that had we been told a very few years ago of the desirability of further improving the quick action freight triple valve, most of us would have stated promptly that such a course is unnecessary.

On account of its satisfactory performance in all of the prominent brake trials, and during long years of actual railway service, much confidence was imposed in this little valve, which was developed after considerable experience by the Westinghouse Air Brake Co. (with the assistance and patience of railway officials); therefore, any suggestion to improve as above stated, regardless of the apparent soundness of reasoning, was usually met with considerable opposition.

As is well known, the plain triple valve was a part of the first automatic air brake and it operated very satisfactorily upon short freight trains, but with the decision of several of the leading railways to handle trains of 50 cars in length, brake tests were made along thline byd a committee of the Master Car Builders Association, with the result that they refused to sanction the use of the plain automatic brake upon trains of this length, the ground for such refusal being found in the long interval between the application of the first and

fiftieth brake in emergency cases (due primarily to inability to reduce brake pipe pressure quickly throughout the train). The most objectionable result of this slow action being serious and damaging shocks to cars and lading. This decision led to further experiments and the subsequent development of the quick action freight triple valve with which device the time of action between first and fiftieth brake was cut down to 2½ seconds just within the admissible limits prescribed by the Master Car Builders Committee. This was accomplished by incorporating valves in each triple which in emergency cases aided the engineer's brake valve in reducing brake pipe pressure, producing an effect similar to the falling of a row of bricks each knocking down next in the row, thus the trouble getting quick action previously experienced with the purely pneumatic brake was entirely overcome, and it was generally recommended and adopted for trains of 50 cars in length.

The length of freight trains has grown in the last few years, however, to 75 and even 100 cars, and we now find the present Master Car Builders quick action freight triple valve unsuitable for the new conditions, and for the very reason that the plain triple was not suitable for 50 car train service, namely, inability to reduce brake pipe pressure sufficiently rapid. Now, however, it is the service application of the brakes which has been affected, while in the previous case cited the emergency feature was the one possessing weakness. The brake pipe of a 50 to 100 car train is of considerable length, and as this volume must be reduced throughout the train by engineer's brake valve on locomotive during service brake applications, it will be manifest that the fall in brake pipe pressure must necessarily be slow, with the result that a number of brakes fail to apply owing to back flow of auxiliary reservoir pressure into brake pipe through feed port, and leakage from brake cylinder to atmosphere through leakage groove. After due deliberation the Westinghouse Co. decided the only practical way to correct this difficulty would be to design a new triple valve, which is now known as the "K" type, and make said triple aid the engineer's brake valve to dispose of brake pipe volume as is done when emergency action is desired, and accordingly ports controlled by slide and graduating valves were introduced, which vent to the brake cylinder producing triple valve action similar in a way to that experienced in emergencies and insuring the application of all brakes in a 50 to 100 car train, in fact, tests with 80 car trains having this improvement show that stops can be made from a speed of 22 miles per hour without about one-fourth the expenditure of air necessary with old triples; reduced to cubic feet of air used this means as 54½ cubic feet of free air is to 217, or using more familiar words, a 5 lb. brake pipe reduction will do the same work with

improved triple as would require a 20 lb. reduction with the old. Notwithstanding the fact that these remarkable results have been accomplished by modifying the triple valve in the manner indicated, the question is frequently asked—Why were the ports in engineer's brake valve not redesigned and enlarged to bring these conditions about? This question can be disposed of with the statement that it is the friction of brake pipe connections, etc., and not the engineer's valve, which is the controlling factor, therefore, the absolute need of having each triple valve reduce brake pipe pressure locally will at once be obvious. This is known as the quick service feature. Another feature, namely, that of retarded release is also embodied in the "K" triple valve, and provides for the very slow release of head brakes in train and the quick release of ones at the rear. This action is conducive to a gradual adjustment of slack between cars and enables engineers to release brakes upon long freight trains while running at very low speeds, and without fear of braking trains in two. Heretofore engineers would not attempt to release brakes upon long trains running at speeds of less than ten miles per hour, instead the train would be stopped, brakes released, and then started again. All here I think, have a fair idea what it means in dollars and cents to a railway company to be required to stop and start a 75 or 100 car train frequently, while moving over the various divisions. As above stated, the "K" triple valve renders this practice unnecessary, and also has the additional features of insuring uniformity in charging of auxiliaries, a more prompt release of rear brakes (in some cases 35 to 55 seconds earlier, and a greater factor of safety due, as before stated, to the fact that a 5 lb. brake pipe reduction with the "K" triple is equally as effective as a 20 lb. reduction with the older type of valve. In this connection it is a pleasure to be able to state that all of the features mentioned can be incorporated in the shell of the present or older type of valve, thousands of which are now in service upon the various railways.

Owing to the peculiar and exacting conditions confronting electric traction railways in the congested districts of our large cities during rush hours, holidays, etc., they are gradually changing their methods of operation, instead of putting on a large number of additional single motor cars, which practice has been followed for years, and it is admitted now can be carried to extremes, the tendency seems to be to run cars in trains of two or more cars, in some instances the trains consist of a motor car with trailer pure and simple, and frequently trains are made up of two motor cars. The scheme seems to have grown in popularity with the public, which is proven by the fact that in one place where trailers were tried as an experimental measure, the company was asked to restore them. For this

particular class of service we have developed what is known as schedules SME, AMS, AMT, AMM and AMR, with electrical attachments for any of these schedules, all of which have proven eminently satisfactory for the purpose intended. Some of the requirements for city as well as interurban service, from a braking standpoint, are quick recharge of auxiliary reservoirs, prompt response of triples to all brake pipe reductions, quick service, low maximum braking effort for service stops, and high maximum braking effort for emergency stops—ability to apply brakes from any car in train, and automatic application of brakes in case of hose bursting or separating between cars. It has been found also that many of these important features can be extended to fast passenger steam railway service, greatly to the advantage of railway companies, both in service and emergency stops. The improved passenger triple is known as the type "L," and like all the other new types (except "K") is of the pipeless order. This triple, together with the remaining ones touched upon, will now be described by the aid of lantern slides.

- Slide 1—External view of K-2 triple.
 " 2—Vertical cross section of K-2 triple valve.
 " 3—Triple valve in the release position.
 Fig. 5—Triple valve, service position.
 " 6—K-2 triple valve, service lap position.
 " 7—K-2 triple valve, retarded release position.
 " 8—K-2 triple valve in the emergency position.
 " 10—Type D.E.G. motor driven pump in traction service.
 " 4—Motor driven compressor and suspension pump.
 " 5—Type J, electric pump governor with cover removed.
 " 10—S.M.E. equipment.
 " 12—A.M.S. brake equipment.
 " 10—S-1 triple valve.
 " 12—S-1 triple valve release position.
 " Illuminated duplex air guage. (Night).
 " Illuminated duplex air guage. (Daytime).
 " 10—Diagram of stops, comparing old and new equipments.
 " 22—Diagram of the A.M.R. brake equipment.
 " 13—T-2 triple valve and supporting bracket.
 " 14—T-2 triple valve, section in release position.
 " 16—T-2 triple in release position.
 " 17—T-2 triple valve, service position.
 " 18—T-2 triple valve, in service lap position.
 " 19—T-2 triple valve, in graduated release position.
 " 20—T-2 triple valve, in emergency position.
 " 18—Diagram showing differences of time and distance required for making stops with old and new equipment.

- Fig. 22—M-2 triple valve (section).
 “ 24—M-2 triple valve, release position.
 “ 25—M-2 triple valve, in service position.
 “ 26—M-2 triple valve, in service lap position.
 “ 27—M-2 triple valve, in release lap position.
 “ 28—M-2 triple valve, emergency position.
 “ 15—Diagram of cylinder pressures, comparing old and new equipments.
 “ 17—Diagram showing results of rapid re-applications comparing old and new equipment.
 “ 23—Diagram of A.M.R. electric brake equipment.
 “ 37—L-1-A triple, emergency position.
 “ 38—L-2 triple valve in section.
 “ —L triple valve.
 “ 41—L-2 triple in service position.
 “ 42—L-2 triple valve, service lap position.
 “ 43—Triple valve in graduated release lap position.
 “ 44—L-2 triple valve in emergency position.
 “ 16—Diagram showing rapidity of recharging auxiliary reservoirs, comparing old and new equipment.

The Chairman,—

I am sure, gentlemen, you have listened with a great deal of interest to Mr. Brown's discourse, and it is too bad we cannot publish all that has been said by this able lecturer. To describe the different movements of the triple valve takes considerable time, and it is almost impossible to do it on paper. Without us having the advantage of seeing the different cuts, which has been shown to us on the screen, we would not have understood Mr. Brown's paper so well. We have a number of air brake men with us to-night, whom we shall be pleased to hear from in connection with this paper, and I am sure Mr. Brown will be pleased to answer any questions anyone wishes to ask him. I take much pleasure in calling upon Mr. Black,

Mr. Black,—

Mr. President and gentlemen : I have listened with pleasure and interest to the remarks of Mr. Brown, and am sure that all present have enjoyed the lecture to-night. In looking around I see quite a number here who are not directly interested either in steam or electric railways, and I therefore would not wish to open a long discussion on the air brake, but it certainly demonstrates to us that the Westinghouse people are determined to meet every requirement. There are one or two points in connection with this matter I would like to ask Mr. Brown. One is : How they are able to retain 85 lbs. brake pressure before coming to a stop without doing damage to the wheels ?

The other question I wish to ask is : Why they prefer two auxiliary reservoirs in addition to reservoirs already in use, in preference to a large one ?

Mr. Brown,—

In answer to Mr. Black's first question, can state that it is possible under some conditions for wheels to pick up, but experience with the higher braking power shows that, even though wheel sliding does occur in some parts of train, the other brakes are doing such a tremendous amount of holding that the sliding wheels do not travel far enough to do damage. As an illustration can state that most mechanical men with the introduction of the high speed brake anticipated a great deal of trouble from wheel sliding, but long experience shows that this difficulty never materialized.

Respecting Mr. Black's second question I only suggested as a matter of convenience the placing of the supplementary reservoir volume in two units upon the car. There is no reason, however, why this volume could not be located upon the car in one unit if desirable.

The Chairman,—

I understand we have Mr. L. C. Ord of the Canadian Northern Railway with us. Perhaps that gentleman would like to ask a question.

Mr. Ord,—

Mr. President and gentlemen, I thank you for asking me to speak on the subject, but after Mr. Brown's interesting discourse I do not think there is room for any of us to add to it. I have watched with interest and have seen the Westinghouse people meet each failure or trouble with improved types of apparatus in the past, and I must say it is wonderful when I note the progress described by Mr. Brown to-night. This brake, which is far more serviceable on long freight trains than is the older types, is equally more serviceable on heavy mountain grades; meeting, in fact, all conditions. I wish to thank Mr. Brown myself for having had the pleasure of listening to one of the best and most instructive lectures I have ever heard.

The Chairman,—

We have present with us Mr. McCabe of the Toronto Electric Railway Co., and would be glad to hear from him.

Mr. McCabe,—

We have the Magann air brake in use on the Toronto Street Railway. What I wish to ask Mr. Brown is: Whether the use of one of these triple valves to go automatically on trailer in connection with straight air on motor, would be satisfactory.

Mr. Brown,—

In answer to Mr. McCabe's question, can state that the emergency valve used with our Schedule S.M.E. can be used in conjunction with the type of brake referred to. In addition it would be necessary to place an emergency valve and auxiliary reservoir upon the trailer, together with a pipe line upon motor car and trailer. With this arrangement brakes would apply automatically upon motor car and trailer in case of hose bursting or separating between the cars. Automatic application of the brakes could also be obtained by opening the conductor's valve in the trailer or placing the motorman's brake valve in the emergency position. During all service stops the automatic feature of the brake would remain inoperative.

The Chairman,—

I believe Mr. Mooney saw a number of experiments on this triple valve in Buffalo. If he is present would like to hear from him. (Not present.)

The Chairman,—

If Mr. Wright, Instructor of Grand Trunk Railway brake equipment, is present, shall be pleased to hear from that gentleman.

Mr. Wright,—

President and gentlemen, I do not know that I can say very much on this question. I have listened very attentively to the remarks made by Mr. Brown, and wish to say I could not make any further criticisms. I have visited the works of the Westinghouse Co. at Hamilton three or four times during the last month, and have been treated very courteously. I would be pleased, Mr. President, if you will extend to Mr. Brown my thanks for the very interesting and able lecture.

The Chairman,—

I believe Mr. J. W. Kelly, who is a representative of the C.P.R. Car Department, is here with us to-night. Has Mr. Kelly any remarks to make?

Mr. Kelly,—

Mr. President, I do not think I could add anything to what has already been said. I have listened very closely to the re-

marks of Mr. Brown, and I think they have met with the approbation of everybody present. The new style triple valve is not an old thing with us on the C.P.R. Perhaps Mr. Dale, who is connected with the C.P.R., and who is used to handling air brakes, might wish to ask something about this question.

Mr. Dale,—

Mr. President and gentlemen : I am sure I listened with a great deal of pleasure to the discourse this evening. The new triple valve is something new to me. I am, of course, pretty well conversed with the old action triple valve, yet there are features in this new one which I would like to study up very closely before I would wish to ask any questions. I always go on the line, that nothing is right that is not worth criticism. I think we have a subject before us to-night which is well worth criticism. There is one question, however, which was asked to-night regarding the working of the new automatic triple valve, that of putting two auxiliary reservoirs on a car instead of one large one ; I am not quite clear on this. I am sorry I did not get hold of some of this new work before this, so that I could ask more critical questions, but in future if I have the pleasure of attending any more of this club's meetings, I shall certainly prepare myself for this work.

Mr. Brown,—

I fear I have not made myself clear on the matter of arrangement of supplementary reservoir volume. As before stated, there are two ways of obtaining the graduated release feature on passenger trains, one by the use of the extra pipe line known as the "control line," and the other by the use of supplementary reservoirs under each car. As steam railways already have two air pipe lines on their passenger trains, they do not care to apply the third line, and instead prefer the supplementary reservoir scheme which accomplishes the same result.

About the retarded release feature belonging to the freight triple valve and the experiments our President referred to made recently in Buffalo, I witnessed the same tests made with a 50-car train. In one instance the brakes were applied fully with a service application, and at a very slow speed brakes were released and engine given steam before rear brakes had opportunity to release. Where this was done and new triple valves in use the draft gear strains were reduced to 34,000 lbs. as compared with 169,000 lbs., when old triples were used under similar conditions.

The Chairman,—

As it is growing late, and I know there are a number of gentlemen who would like to speak regarding this subject, yet I do not feel it is right for us to call upon Mr. Brown to speak any more this evening, as we have already taken up so much of his time. However, in order to allow those who would like to get home at a reasonable hour, and for those who would like to discuss this matter further, we might have fifteen minutes discussion before the opening of the next meeting.

Unless otherwise advised, the next meeting will be held in Room 192, Rossin House. I might say the manager of this hotel has been kind enough to give us the use of this room free of charge.

Adjournment :

Moved by Mr. McCrae, seconded by Mr. Wright, that meeting be adjourned.